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INVESTIGATION OF RANGES FOR PROTON RECOIL REACTION PRODUCTS IN GAS MIXTURES OF POSITION SENSITIVE NEUTRON DETECTORS. J. Craft, A. Barzilov*, Western Kentucky University, Department of Physics and Astronomy, Bowling Green, Kentucky, 42101, alexander.barzilov@wku.edu

Neutron detectors with precise spatial resolution are essential in modern neutron scattering applications. They are also valuable in homeland security area due to their ability to detect and locate nuclear materials. The focus of this presentation is gas properties of position sensitive gaseous neutron detectors. In order to indirectly detect neutrons, the proton recoil reaction between a single neutron and a helium-3 is utilized. The resultant reaction products, proton and triton, create approximately 25,000 electron-ion pairs with an initial cloud charge of about $4*10^{-15}$ C. The distance traveled, or range, of the proton and triton determines the size of the initial ionization cloud and thus the spatial resolution of the detector. Different gas mixtures must be added to the helium-3 gas in order to decrease the range of the particles and increase the resolution of the detector. The results of computational investigation of the range of the products of the proton recoil reaction for a variety of mixtures of helium-3 gas with other additives such as argon, methane, etc. will be discussed.